XC221A Series

ETR1201_002

1.2V Input / Output Rail To Rail CMOS Op Amp

■GENERAL DESCRIPTION

The XC221A series is an input / output rail to rail CMOS Op Amp.
With rail to rail functions, operation is guaranteed from power supplies as low as 1.2V. Moreover, since the XC221A series comes in an ultra small SOT-25 package, the series is particularly suited for use with various types of portable phones. Bandwidths of 550kHz and slew rates of 0.5V can be achieved even with power consumption as low as 100 μA.
Even with large capacitance levels of CL = 200pF (unity gain connection), the XC221A series will not be susceptible to oscillation.

■APPLICATIONS

● Palmtop computers, PDAs

● Cellular and portable phones

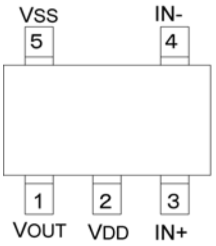
● Portable audio systems

● Various battery powered systems

■FEATURES

Operating Voltage Range: 1.2 ~ 10V (single cell)
: ±0.6 ~ 5V (+ve/-ve supply)
Output Signal : 0.1~2.9V (3V single cell, RL=2kΩ)
Gain Bandwidth : 550kHz (15 μA: 210kHz)
Slew Rate : 0.5V/ μs
High Capacitance Load : CL=200pF
Low Supply Current : 100 μA, 15 μA
Input / Output Rail To Rail Operation
Package : SOT-25
Environmentally Friendly: EU RoHS Compliant, Pb Free

■PIN CONFIGURATION



SOT-25
(TOP VIEW)

■PIN ASSIGNMENT

PIN NUMBER	SYMBOL	FUNCTION
1	VOUT	Output Pin
2	VDD	Positive Power Supply Pin
3	IN+	Positive Input
4	IN-	Negative Input
5	VSS	Negative Power Supply Pin

■PRODUCT CLASSIFICATION

●Ordering Information

XC221A①②③④⑤⑥-⑦ (*1)

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①	The Number of Channels	1	One channel
②	Supply Current	1	15 μA
		2	100 μA
③	Internal Standard Number	0	Fixed
④	Load Capacitance	0	200pF
⑤⑥-⑦	Packages Taping Type (*2)	MR	SOT-25
		MR-G	SOT-25 (Halogen & Antimony free)

(*1) The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

(*2) The device orientation is fixed in its embossed tape pocket. For reverse orientation, please contact your local Torex sales office or representative. (Standard orientation: ⑤R-⑦, Reverse orientation: ⑤L-⑦)

■ABSOLUTE MAXIMUM RATINGS

Ta = 25℃, V_{SS} = 0V

PARAMETER	SYMBOL	RATINGS	UNITS
V_{DD} Pin Voltage	V_{DD}	-0.3 ～ 12.0	V
OUT Pin Voltage	V_{OUT}	-0.3 ～ 12.0	V
IN Pin Voltage	V_{IN+}	-0.3～V_{DD}+0.3	V
IN/ Pin Voltage	V_{IN-}	-0.3～V_{DD}+0.3	V
OUT Pin Current	I_{OUT}	±100	mA
Power Dissipation	Pd	150	mW
Operating Temperature Range	Topr	-30 ～ +80	℃
Storage Temperature Range	Tstg	-40 ～ +125	℃

RAIL-TO-RAIL is a trademark of Motorola.

■ELECTRICAL CHARACTERISTICS

XC221A1100 I_{DD} =15 μA Ta = 25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Voltage	V_{DD}		1.2	-	10.0	V
Supply Current	I_{DD}	V_{DD} = 3V	10	15	23	μA
		V_{DD} = 1.2V	2.5	8	23	μA
Input Offset Voltage	V_{OF}		-	-	20.0	mV
Input Offset Current	I_{OF}		-	1	-	pA
Input Bias Current	IB		-	1	-	pA
Input Resistance	R_{IN}		-	1	-	TΩ
Large Signal Voltage Gain	A_{VD}		75	110	-	dB
Common Mode Rejection Ratio	C_{MRR}	0≦V_{CM}≦3.0V	60	75	-	dB
Power Supply Rejection Ratio	P_{SRR+}	V_{DD} = 3 to 10V, V_{SS} = 0V, V_{OUT} = 1.5V	60	75	-	dB
	P_{SRR-}	V_{SS}=-3 to -10V, V_{DD}= 0V, V_{OUT}= -1.5V	60	75	-	dB
Output Voltage Range	V_{OUT}	R_L = ∞	0.05	-	V_{DD}-0.05	V
		V_{DD} = 1.2V, R_L = 47kΩ (to V_{DD}/2)	0.10	-	1.10	V
		V_{DD} = 3V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	2.90	V
		V_{DD} = 5V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	4.90	V
		V_{DD} = 10V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	9.80	V
Gain Bandwidth	F_T	V_{DD} = 3V	-	210	-	kHz
Slew Rate	S_R	V_{DD} = 3V	-	0.07	-	V/μsec

Test Conditions :Unless otherwise stated, V_{DD} = 3.0V, V_{SS} = 0V, V_{CM} = V_{OUT} = V_{DD} / 2, RL = 1MΩ (to V_{SS}), C_L = 10pF (to V_{SS})

XC221A1200 I_{DD} =100 μA Ta = 25℃

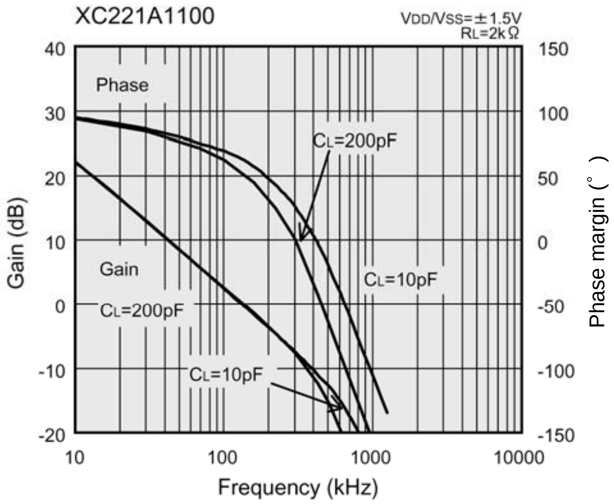
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Voltage	V_{DD}		1.2	-	10.0	V
Supply Current	I_{DD}	V_{DD} = 3V	67	100	150	μA
		V_{DD} = 1.2V	16.75	50.00	150.00	μA
Input Offset Voltage	V_{OF}		-	-	20.0	mV
Input Offset Current	I_{OF}		-	1	-	pA
Input Bias Current	I_B		-	1	-	pA
Input Resistance	R_{IN}		-	1	-	TΩ
Large Signal Voltage Gain	A_{VD}		75	110	-	dB
Common Mode Rejection Ratio	C_{MRR}	0≦V_{CM}≦3.0V	60	75	-	dB
Power Supply Rejection Ratio	P_{SRR+}	V_{DD}=3 to 10V, V_{SS} = 0V, V_{OUT} = 1.5V	60	75	-	dB
	P_{SRR-}	V_{SS}=-3 to -10V, V_{DD}=0V, V_{OUT}=-1.5V	60	75	-	dB
Output Voltage Range	V_{OUT}	R_L = ∞	0.05	-	V_{DD}-0.05	V
		V_{DD} = 1.2V, R_L = 47kΩ (to V_{DD}/2)	0.10	-	1.10	V
		V_{DD} = 3V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	2.90	V
		V_{DD} = 5V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	4.90	V
		V_{DD} = 10V, R_L = 2kΩ (to V_{DD}/2)	0.10	-	9.80	V
Gain Bandwidth	F_T	V_{DD} = 3V	-	550	-	kHz
Slew Rate	S_R	V_{DD} = 3V	-	0.50	-	V/μsec

Test Conditions :Unless otherwise stated, V_{DD} = 3.0V, V_{SS} = 0V, V_{CM} = V_{OUT} = V_{DD} / 2, R_L = 1MΩ (to V_{SS}), CL = 10pF (to VSS)

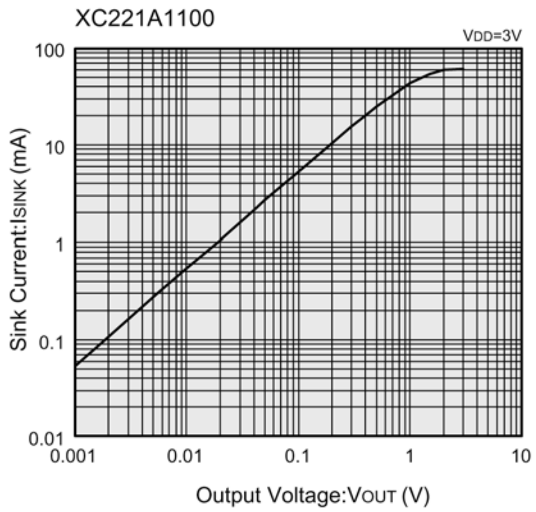
■TYPICAL PERFORMANCE CHARACTERISTICS

●XC221A1100 <15μA>

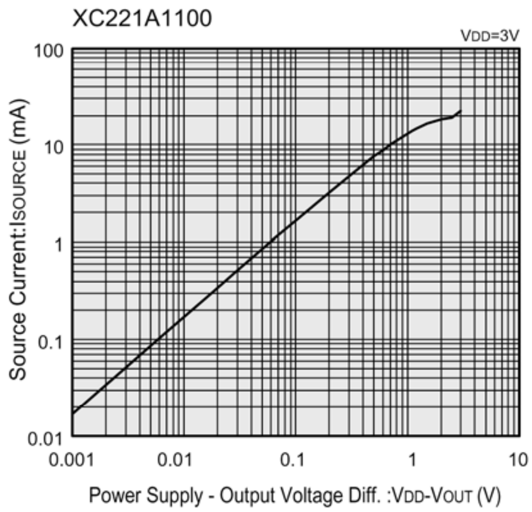
(1) Voltage Gain vs. Phase Margin



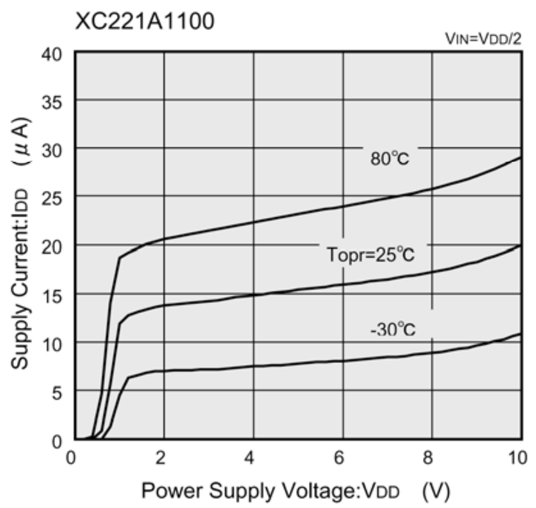
(2) Sink Current vs. Output Voltage



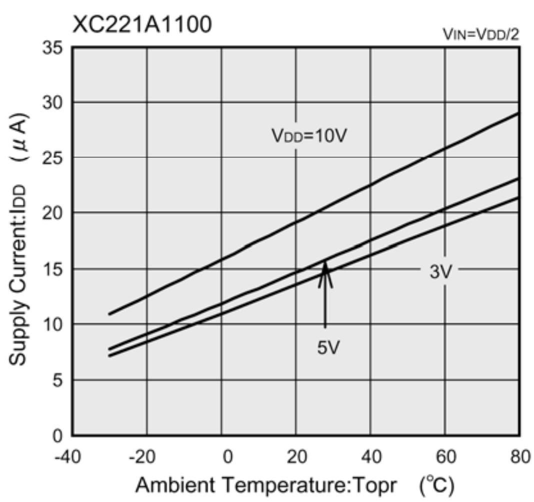
(3) Source Current vs. Output Voltage



(4) Supply Current vs. Power Supply Voltage



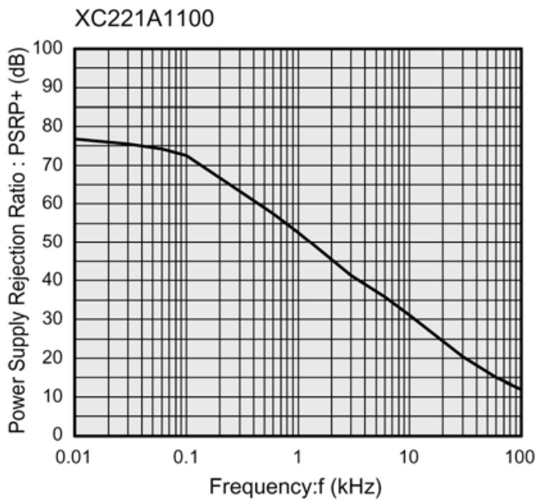
(5) Supply Current vs. Ambient Temperature

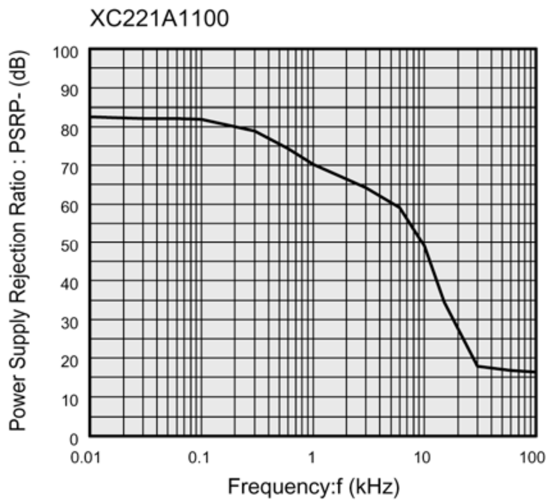


■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

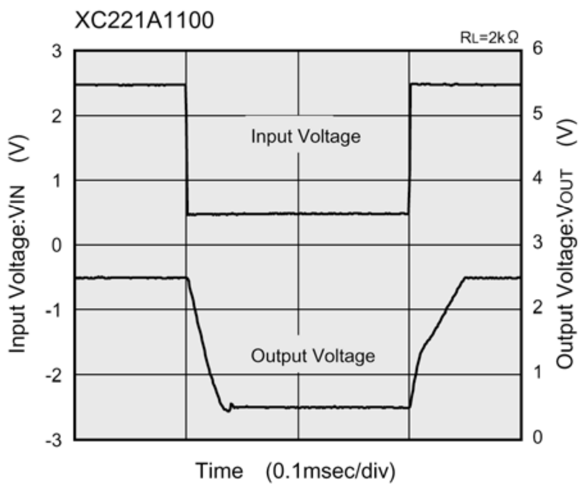
●XC221A1100 <15 μ A> (Continued)

(6) Power Supply Rejection Ratio vs. Frequency

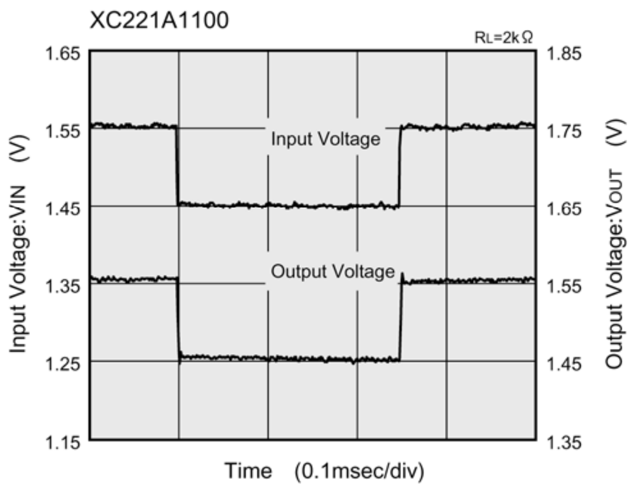




(7) Large Signal Input / Output Response



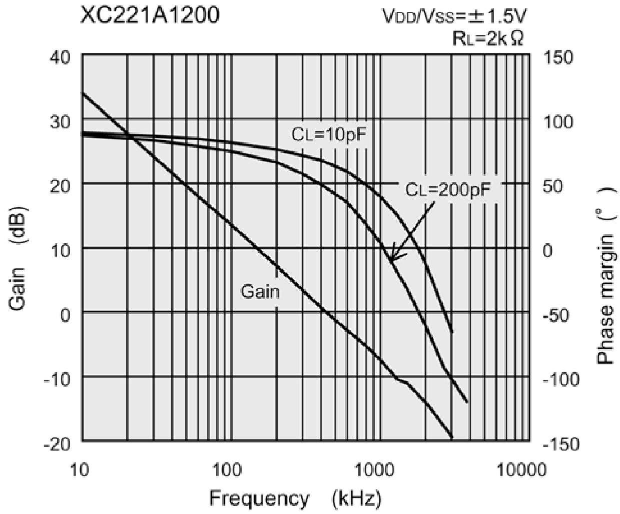
(8) Small Signal Input / Output Response



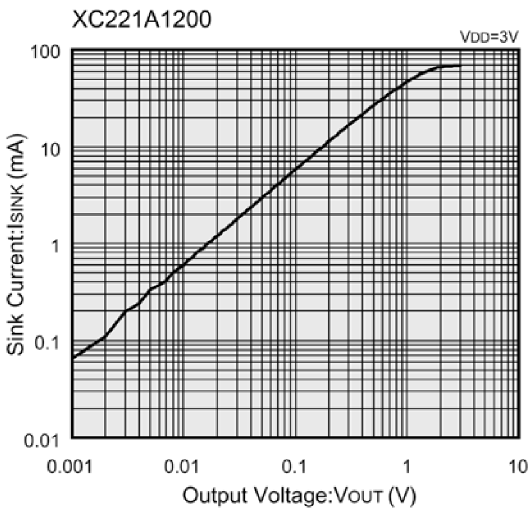
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

●XC221A1200 <100μA>

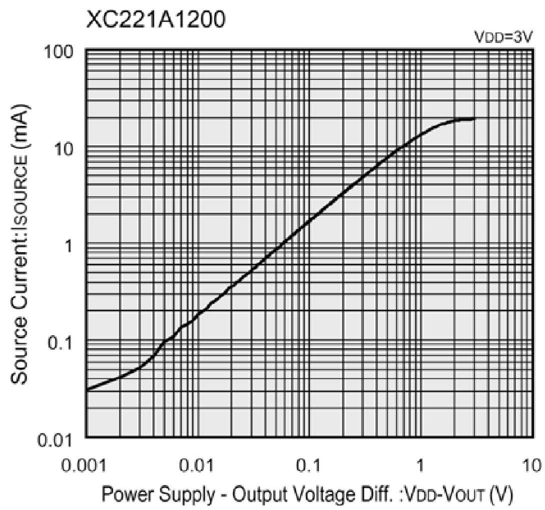
(1) Voltage Gain vs. Phase Margin



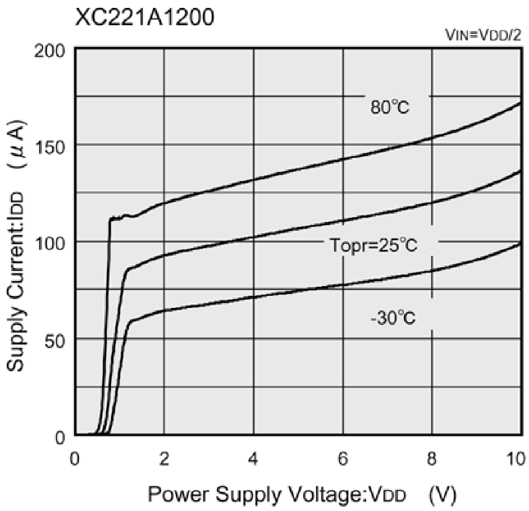
(2) Sink Current vs. Output Voltage



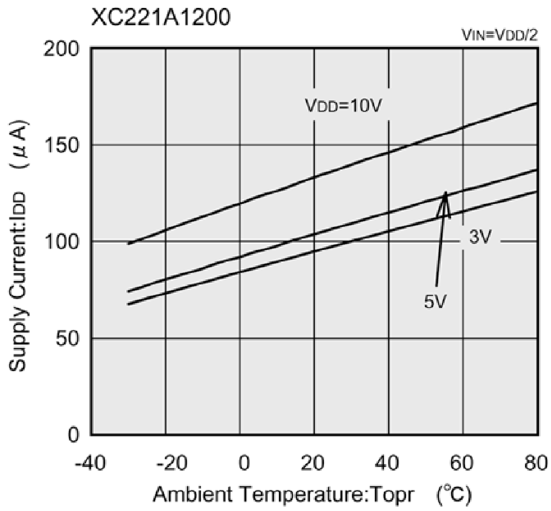
(3) Source Current vs. Output Voltage



(4) Supply Current vs. Power Supply Voltage



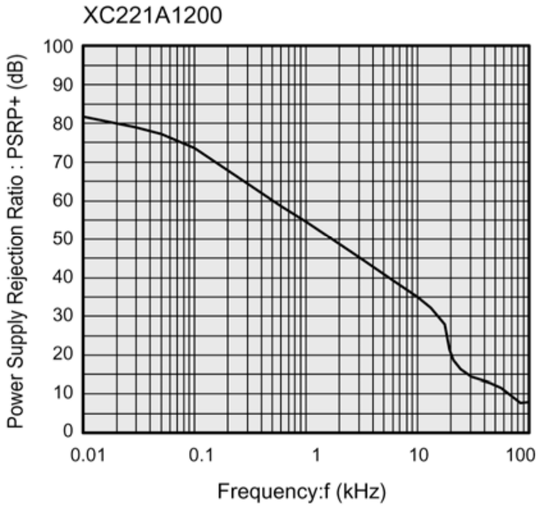
(5) Supply Current vs. Ambient Temperature

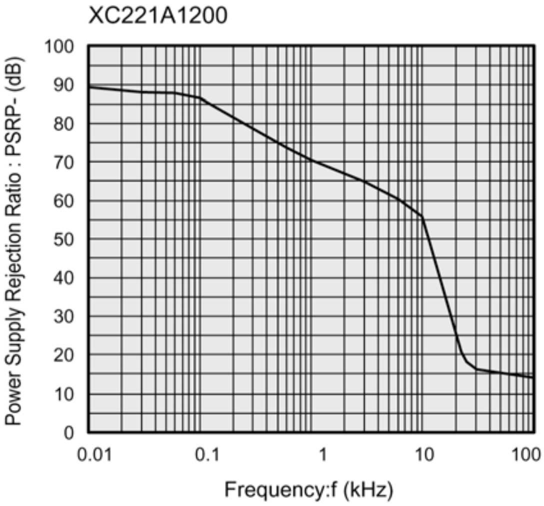


■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

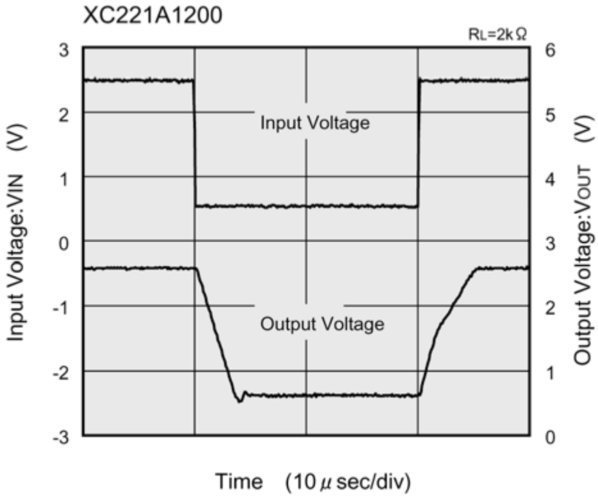
●XC221A1200 <100 μ A> (Continued)

(6) Power Supply Rejection Ratio vs. Frequency

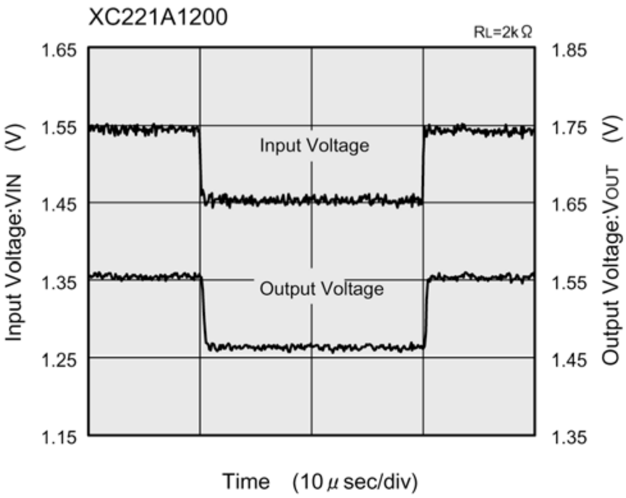




(7) Large Signal Input / Output Response

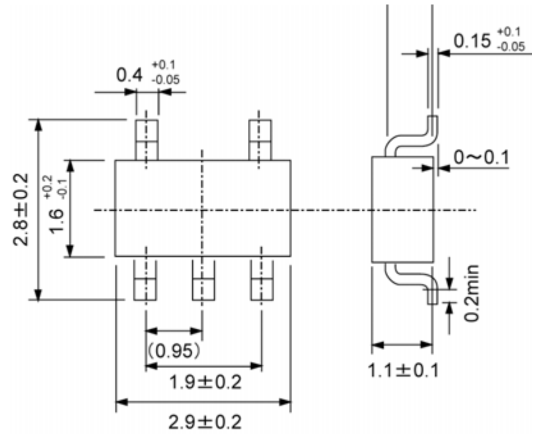


(8) Small Signal Input / Output Response

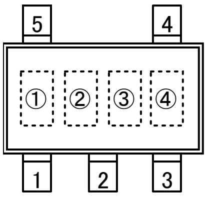


■PACKAGING INFORMATION

●SOT-25



■MARKING RULE



SOT-25
(TOP VIEW)

① represents product series and supply current

MARK	PRODUCT SERIES	SUPPLY CURRENT
$\overline{1}$	XC221A11	15 μA
$\overline{2}$	XC221A12	100 μA

② based on internal standards

③ represents load capacitance

MARK	LOAD CAPACITANCE
0	200pF

④ represents the production lot number
0 to 9, A to Z repeated (G, I, J, O, Q, W excluded)

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